الجمهورية الجزائرية الديمقراطية الشعبية
People's Democratic Republic of Algeria

Ministry of Higher Education and Scientific Research National School of Cyber Security	NSCS المدرسة الوطنية العليا في الأمن السيبراني NATIONAL SCHOOL OF CYBERSECURITY	وزارة التعليم العالي والبحث العلمي المدرسة الوطنية العليا في الأمن السيبراني
Foundation Training Department		**قسم التكوين القاعدي**
LEVEL : 1st Year Basic Training SECTION / GROUP : A & B MODULE : Computer Architecture1 FULL NAME :.	**Midterm 1 Test**	MODULE'S TEACHER: Pr. S.Hemam DATE :25 / 11/ 2024 DURATION : 1h30 *NOTE : No documents are allowed.*

Exercise 1: (7.5 Pts)

1) Perform the following conversions:

Base =10	Base =2	Base =8	Base =16
39,875			
$16^2 + 2^5 + 2^3 + 16^{-1}$			
		65,7	
			3D,4

$E6A_{(16)}$ = (Gray)

$1100011_{(Gray)}$ = (10)

Number	Base =2	BCD	Ecess-3
$126_{(8)}$			
$31_{(16)}$			

2) Perform the following operation in BCD: $126_{(8)} + 31_{(16)}$

Exercise 2: (4.5 Pts)

a) Consider the portion of the ASCII table below, where each character is coded under 8-bits:

Code en Décimale	Symbole ASCII	Code en Décimale	Symbole ASCII	Code en Décimale	Symbole ASCII	Code en Décimale	Symbole ASCII
..	..	71	G	78	N	85	U
65	A	72	H	79	O	86	V
66	B	73	I	80	P	87	W
67	C	74	J	81	Q	88	X
68	D	75	K	82	R	89	Y
69	E	76	L	83	S	90	Z
70	F	77	M	84	T	..	..

1) Find the codes corresponding to the word "**PNG**" according to the above table:

The word	Code		
	Base =10	Base =16	Base =2
PNG			

b) Determine the Decimal, Sign and Magnitude, 1's complement, and 2's complement values for the following cases (using 9 bits):

Decimal	Sign and magnitude	1'complement	2'complement
+25			
		111010111	
			111100110

1) Perform the following operations using 7 bits in 2's complement, then provide the results in decimal:

- $-2D_{(16)} + 23_{(8)}$
- $+45_{(8)} + 2E_{(16)}$

Exercise 3: (4 pts)

1) Provide the ANSI/IEEE 754 representation in single precision (32 bits) for the following numbers:
   - $(-39.875\times2^{-107})_{(10)}$
   - $(+53.25\times2^{-133})_{(10)}$
2) Express the values of X and Y, corresponding to the following ANSI/IEEE 754 representations, in the form $\pm M*2^{Er}$ (where M and Er are decimals):
   - $X = 1\,10010011\,10000000000000000000000_{(2)}$
   - $Y = 10000000010000000000000000000000_{(2)}$

Exercise 4: (4 pts)

Consider the following Boolean function:

$$F(X,Y,Z)=X.Z + X\,(\bar{Z}.Y + Z.\bar{Y})$$

1. Construct the truth table for **F**
2. Find both the canonical Sum of Products (SOP) and Product of Sums (POS) forms for F.
3. Simplify the Boolean expression for F.
4. Draw the Logic-Diagram of the simplified **F** using the **NANDs** logical gate

Good luck